A-adjectives, statistical preemption, and positive evidence

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Abstract

A certain class of English adjectives known as *a*-ADJECTIVES resists appearing attributively, as prenominal modifiers (e.g., *afraid* boy, *asleep* man). Yang (2015) critiques the proposal that this dispreference is learned on the basis of indirect negative evidence—statistical preemption—arguing that children cannot amass the requisite evidence before they are three; however, in fact, children are not cognizant of the restriction until they are roughly ten years old. Moreover, there is a misunderstanding about how statistical preemption is supposed to work; it is not the case that all and only relative clause uses of the adjectives are relevant; rather, preemptive evidence exists when an attributive use could have been expected in the particular context, yet a related but distinct formulation is repeatedly witnessed instead. Following Bruening (2011), Yang suggests certain positive evidence for the restriction, namely that *a*-adjectives behave like locative particles in occurring with certain adverbs such as *far* and *right*. However, we demonstrate that such evidence does not exist for the majority of *a*-adjectives (e.g., *alive*; *afraid*), and in any case this evidence would be insufficient because the diagnostic adverbs occur more frequently with typical adjectives (e.g., *greater*, *alphabetical*). Moreover, relating *a*-adjectives to locative particles does not provide evidence of the critical restriction because locative particles themselves can sometimes appear as prenominal modifiers (*the on button, the up escalator*). We conclude that statistical preemption is consistent with the available evidence, while Yang’s proposed positive evidence is not.

Keywords:
a-adjectives, statistical preemption, positive evidence
1. **The restriction on a-adjectives**

There are certain restrictions on language that do not follow from general semantic, phonological, or syntactic facts in any obvious way. One such case involves a class of adjectives which begin with a syllabic schwa (“a”) and resist appearing prenominally in attributive position (Beard 1995, Bolinger 1971, Bouldin 1990, Cinque 2010, Huddleston & Pullum 2001, Larson & Marušić 2004). We refer to these as *a*-adjectives; examples are provided in (1):

1. A-ADJECTIVES
   a. ?? the/an asleep child  
   b. ?? the/an afraid man  
   c. ?? the/an alone boy  
   d. ?? the/an aware woman  
   e. ?? The/an alive monster  
   f. ?? The/an ablaze building  
   g. ?? the/an afloat ship  
   h. ?? the abloom flowers

Notice that near synonyms (2) and non-*a*-adjectives with closely related phonology (3) readily appear attributively:

2. Semantic near-synonyms
   a. the/a sleeping child  
   b. the/a scared man  
   c. the lonely boy  
   d. the alert woman  
   e. the/a living monster  
   f. the/a burning building  
   g. the floating ship  
   h. the blooming flowers

3. Phonologically related non-*a*-adjectives
   a. the/an adult male  
   b. the/an astute comment  
   c. the/an acute sickness  
   d. the/an aloof woman

The key distinction between the *a*-adjectives in (1) and the non-*a*-adjectives in (3) appears to be related to the fact that each of the words in (1) is morphologically segmentable into *a*- plus a semantically related stem (Boyd & Goldberg 2011, Coppock 2008). Other adjectives

\[1\] Yang argues further, following Salkoff (1983: 299) and Coppock (2008: 181) that “the ungrammaticality of attributive usage appears associated not with the *a*-adjectives per se but with the aspectual prefix *a*-, as shown in the novel adjectives below:

a. The tree is abud with green shoots.  
   ??An abud tree is a beautiful thing to see.  
b. The water is afizz with bubbles.  
   ??The afizz water was everywhere.”
with similar phonology, but which are not segmentable, fall outside the *a*-adjective category. For example, /dult/ in *adult* is not an English morpheme, and neither are the syllables /stut/, /cyut/ and /luf/ in *astute, acute* and *aloof*. We can conclude that while *a*-adjectives are partly defined by the way that they sound, the category does not reduce to phonological or semantic characteristics.

The restriction on *a*-adjectives is diachronically motivated by the history of many of the adjectives as prepositional phrases. For example, *asleep* comes from the Old English prepositional phrase, *on sleep* (Boyd & Goldberg 2011; Long 1969). As prepositional phrases, it made sense that they would not occur attributively. Today’s speakers, however, are generally unaware of the historical origin of these adjectives, and yet they implicitly recognize and respect their unusual distributional pattern. Moreover, new instances can be assimilated to the restricted subcategory of *a*-adjectives. For example, *afraid* never was a prepositional phrase, but it nonetheless resists attributive use (Boyd & Goldberg 2011).

The unusual distribution of *a*-adjectives poses a clear learnability challenge. How do speakers learn to avoid using these adjectives in prenominal attributive position?

2. **Statistical Preemption**

The learnability challenge is just as relevant to accounts that posit underlying structure or invisible features as it is to surface-based accounts. This is because, in order to learn that *a*-adjectives resist attributive use, it is not sufficient to appeal to an invisible feature or some type of underlying syntactic structure, because the learner has to have some way of inferring the invisible feature or underlying structure from the surface input. Without positive evidence that *a*-adjectives are unlike other adjectives, some type of indirect negative evidence of the restriction is needed (Goldberg 2011a, Yang 2015).

Statistical preemption or “blocking” of a target form is the process of learning to avoid a potential target form because a competing form has been consistently witnessed instead in

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However, while *a* - can be used somewhat productively with a process interpretation evident in (a) and (b), this aspectual interpretation is not available for all *a*-adjectives and so cannot explain the restriction on e.g., *afraid, alone, or asleep.*
contexts in which the target form would otherwise have seemed appropriate. This is the widely accepted view of how children learn to avoid morphological overgeneralizations such as goed: went is consistently witnessed in contexts in which goed might have been expected to occur (Aronoff 1976; Kiparsky 1983). A number of researchers have proposed that statistical preemption is capable of scaling up to account for certain non-occurring syntactic formulations that have readily available competing alternatives (Ambridge et al. 2012, Brooks & Tomasello 1999, Goldberg 1995, Goldberg 2006, Goldberg 2011c, Payne et al. 2013, Poser 1992, Robenalt & Goldberg to appear).

3. **Experimental Evidence of Statistical Preemption in a-Adjectives**

Boyd and Goldberg (2011) investigated the role that statistical preemption might play in the acquisition of a grammatical constraint against the attributive use of a-adjectives. Three experiments with the same general structure were reported: in an exposure block, speakers witnessed the experimenter model a simple production task; in a production block, speakers performed the task themselves. The production task consisted of speakers providing descriptions of scenes in which one of two labeled animals moved to a star. For example, in one trial speakers saw two cows—entirely identical except that one was labeled vigilant and the other was labeled sleepy—with the cow labeled sleepy moving to the star. Speakers were then asked, “Which cow moved to the star?” and provided a response. Responses virtually always featured the target adjective used either attributively (e.g., The sleepy cow moved to the star), or predicatively in a modifying relative clause (e.g., The cow that’s sleepy moved to the star). Other trials featured target adjectives that were real (e.g., asleep, afloat) or novel (e.g., ablim, adax) a-adjectives. We reasoned that if speakers avoided using a-adjectives attributively relative to non-a-adjectives like sleepy, then this would indicate that they had learned the constraint against attributive a-adjective use.

None of models in Experiment 1’s exposure block used adjectives that appeared in the production block; Experiment 1 thus provided a baseline measure of speakers’ production preferences. The results showed that a-adjectives resist attributive use. The vast majority of English adjectives are non-a-adjectives, and speakers in Experiment 1 used these attributively at high rates. This indicates that in the discourse context of the production task, the default behavior for most adjectives is to appear attributively. In contrast, speakers showed significant attributive
avoidance for both real and novel *a*-adjectives—actually increasing production of the more cumbersome relative clause construction as a means of steering clear of formulations like *The asleep cow moved to the star*. Moreover, the fact that novel *a*-adjectives resisted attributive use (albeit less strongly than real *a*-adjectives) indicated that speakers implicitly recognize an abstract *a*-adjective category that is capable of weakly attracting new members like *ablim* and *adax*, even though their morphology and meaning is opaque.

Although novel *a*-adjectives in Experiment 1 avoided attributive use, avoidance was less strong than for real *a*-adjectives. Experiment 2 tested to see whether statistical preemption could be used to strengthen attributive avoidance for novel *a*-adjectives. This was accomplished by providing speakers with a handful of preemptive uses in the exposure block—i.e., relative clause descriptions like *The hamster that’s ablim moved to the star*. Speakers then completed the exact same production block used in Experiment 1. The Experiment 2 results were consistent with statistical preemption: relative to Experiment 1 there was a dramatic reduction in attributive responding for novel *a*-adjectives, but not for novel non-*a*-adjectives.

Experiment 3 provided evidence on the limits of statistical preemption. In Experiment 3, the experimenter’s models from Experiment 2 were changed so that novel *a*-adjectives appeared in conjunction with complex adjective phrases, e.g. *The hamster that’s ablim and proud of himself moved to the star*. Since these phrases are independently ungrammatical in attributive position (e.g., *The proud of himself hamster*...), learners cannot know whether *ablim* is appearing predicatively because of a constraint against *a*-adjective use in attributive position, or because it is conjoined to *pride of himself*. Speakers were in fact savvy about the potentially preemptive exposure: since the input was uninformative regarding the presence of a constraint it was essentially ignored. The large reduction in attributive responding for novel *a*-adjectives that was recorded in Experiment 2 disappeared.

4. **Are the results from Boyd and Goldberg’s (2011) Experiment 2 due to structural priming?**

Yang’s (2015) main critique of statistical preemption is based on a corpus analysis of child-directed speech. We address those arguments in the section below. Here we focus briefly on a secondary critique: that the sharp drop in attributive responding for novel *a*-adjectives in Experiment 2 is due to structural priming, not statistical preemption. The priming explanation is
unlikely for a number of reasons. First, in the exposure block, the experimenter modeled identical numbers of attributive and relative clause uses so that no particular structure was favored. Second, in the production block, filler items were carefully counterbalanced so that each critical item was preceded half of the time by fillers like fast, old, and strong—which reliably elicited attributive responses—and the other half by fillers like bites, votes, and cheats—third-person present tense verbs that reliably elicited relative clause responses (e.g., The cat that bites moved to the star). Yang seems to have overlooked these aspects of the design.

5. **Can attributive *a*-adjective use be statistically preempted, given the distributional evidence available in child-directed speech?**

Yang (2015) searched a 4.3 million-word corpus of child-directed speech and found that most of the *a*-adjectives represented in the corpus did not occur in relative clause constructions. From this he concludes that statistical preemption could not possibly account for the restriction against *a*-adjectives being used attributively.

But Yang’s analysis shows a fundamental misunderstanding of how statistical preemption works. He assumes that only adjective uses in relative clauses can have a preemptive effect. The essential prediction however, is that *any* predicative use that occurs in a discourse context in which attributive uses are favored is preemptive. When such uses occur consistently over time, the preemptive effect incrementally strengthens (hence preemption is “statistical”). Thus, Yang’s analysis is problematic in two important respects. First, because only relative clause uses were considered, he most likely undercounted a large number of potentially relevant predicative uses in the corpus. Second, while simple counting can be used to assess entrenchment (Ambridge et al. 2008, Theakston 2004), testing preemption often requires more than just counting. For *a*-adjectives, the analyst must assess the discourse context of each predicative use to determine whether it is occurring in an environment in which attributive uses are favored. This is difficult (if not impossible) to do using automated techniques, which is why testing for statistical preemption in large corpora can be difficult.

A more straightforward approach is for the researcher to experimentally construct the discourse context (Brooks & Tomasello 1999, Brooks & Zizak 2002) so that when predicative *a*-adjective uses do occur, it is clear that they are preemptive. This is was what Boyd and Goldberg (2011) did. Experiment 1 established that in the discourse context of the production task, the
typical way for speakers to use adjectives was attributively: non-\(a\)-adjectives—a class that contains most English adjectives—were strongly favored in attributive position. Given this unambiguous baseline, statistical preemption makes a simple prediction: witnessing novel \(a\)-adjectives being used predicatively in Experiment 2’s exposure block should strengthen the inference that they are dispreferred attributively. This prediction was borne out. Note that there was nothing special about the fact that Experiment 2’s preemptive models were predicative uses in relative clause constructions: this does not amount to an implicit claim that only predicative uses in relative clause constructions can have a preemptive effect. Instead, we used relative clause constructions because they allowed for novel \(a\)-adjectives to appear predicatively in a construction type that naturally fit the discourse context of the production task.

6. **Does statistical preemption mistakenly predict that Santa Claus can’t be a “Jolly Old Elf”?**

Yang’s (2015) corpus analysis of child-directed speech finds that jolly, along with several a-adjectives (afraid, alike, alive, asleep) and a handful of other adjectives (annoying, careful, interested, torn, washable, and wrapped) only appear predicatively in relative clauses, never attributively. From this he concludes that statistical preemption mistakenly predicts that the latter adjectives cannot be used attributively.

But Boyd and Goldberg’s (2011) Experiment 3 shows that not all relative clause uses are preemptive. If a relative clause use is motivated by factors that are independent of the adjective, then it is not taken as evidence that the adjective cannot occur attributively. Such motivation could take on any number of forms—to avoid formulations like The proud of himself hamster, or to include an indication of tense and aspect (e.g., The dog that had been purple conveys information that the purple dog does not). The basic idea is that it is only when learners expect to witness an adjective attributively but instead consistently hear it in some other way that they learn to avoid attributive use.

7. **Does statistical preemption mistakenly predict that adjectives like “green” cannot appear predicatively?**

Yang (2015) also contends that statistical preemption makes the wrong predictions regarding the predicative use of adjectives like green and ancient. These adjectives and a number of others
only occur attributively in his corpus of child-directed speech. If children learned constraints via statistical preemption, Yang argues, then their input would mistakenly lead them to conclude that *The dog is green* is ungrammatical.

However, statistical preemption does not rule out creative, non-attested word uses. In fact many theoretical and experimental accounts of preemption take pains to argue that creative uses are possible (Goldberg 1995, Goldberg 2011a, Robenalt & Goldberg to appear). Learners presumably readily use adjectives predicatively (*the dog is green*), even if they have only witnessed them being used attributively (*the green dog*). That is, we assume that an adjective could be used predicatively unless the learner has encountered multiple occasions in which the predictive use would have been at least as appropriate, but the word was consistently used attributively instead. Since attributive use tends to be more common in most contexts, this situation is unlikely to occur (but cf. *the mere child*, *the child seems mere*).

8. **When do speakers know that attributive *a*-adjective uses are dispreferred?** Yang (2015) examined a 1.9 million-word corpus of child speech and found that the children represented in the corpus, at an average age of 2;10, never used *a*-adjectives attributively. Yang surmises, that this “suggests that English learning children acquire the syntactic properties of *a*-adjectives very early, and the distributional evidence for their acquisition must be robustly available” (Yang 2015: 14). Thus, he seems to assume that non-occurrence in the corpus implies the existence of a constraint, while at the same time denying that learners are able to draw this conclusion themselves.

Yet we concur with Yang that children at age 2;10 are not likely to have witnessed or absorbed sufficient evidence to reliably constrain their use of *a*-adjectives. They may have only witnessed *a*-adjectives used predicatively, but they are unlikely to have witnessed a sufficient number of instances of these *a*-adjectives in contexts where attributive use would have been at least as appropriate. We expect statistical preemption to be a slow and gradual process that can take years, since it requires that learners be able to form expectations and to recognize when one form might have been appropriate but another was consistently witnessed. In fact, it turns out that the restriction on *a*-adjectives may be learned very late.

Hao (2015) ran a version of Boyd and Goldberg’s (2011) Experiment 1 with children who ranged from 6-17 years old. Children younger than ten did not avoid using *a*-adjectives
(asleep, alive, afloat and afraid) attributively significantly less than they used other adjectives (floating, frightened, living, and sleepy) attributively in this context, whereas older children displayed a more adult-like pattern. Hao’s results suggest that speakers do not begin to reliably disprefer the attributive use of a-adjectives until ten years old (see Figure 1).

![Figure 1](image)

**Figure 1.** Results based on Hao (2015) for the production task used in Boyd & Goldberg (2011) with children aged 6-17.

If children do not learn the restriction until they are roughly ten years old, then they may well require much more input than the approximate year’s worth of input that Yang considered.

9. **A-ADJECTIVES SEEM LIKE ADJECTIVES**

Yang (2015) argues that children witness evidence that a-adjectives share the same distribution as locative particles (e.g., up, down, on, in, out)\(^2\), and assumes that locative particles do not occur attributively. Bruening (2011) argues that a-adjectives are prepositional phrases “underlyingly,” not adjectives, and that this is why they resist occurring attributively.

Table 1 classifies the relevant cases into typical adjectives (Class 1), which readily occur attributively; a-adjectives (Class 2), which begin with a morphologically segmentable unstressed schwa and resist occurring attributively; prepositional phrases (Class 3); and locative particles (Class 4). For Yang or Bruening’s line of argumentation to be valid, there must be positive

\(^2\) We follow Yang’s terminology here in referring to these as particles, but in fact, we are persuaded by Huddleston & Pullum (2001)’s arguments that there is no principled reason to distinguish most of them from prepositions (see also Goldberg, to appear).
evidence that \textit{a}-adjectives (Class 2) systematically pattern like prepositional phrases (Class 3) or locative particles (Class 4), and unlike typical adjectives (Class 1).

<table>
<thead>
<tr>
<th>1. TYPICAL ADJECTIVES</th>
<th>2. \textit{A}-ADJECTIVES</th>
<th>3. PREPOSITIONAL PHRASES</th>
<th>4. LOCATIVE PARTICLES$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{asleep}</td>
<td>\textit{afloat}</td>
<td>\textit{on the table}</td>
<td>up</td>
</tr>
<tr>
<td>\textit{afraid}</td>
<td>\textit{into the room}</td>
<td></td>
<td>down</td>
</tr>
<tr>
<td>\textit{alone}</td>
<td>\textit{to the house}</td>
<td></td>
<td>on</td>
</tr>
<tr>
<td>\textit{ablaze}</td>
<td>\textit{at two o’clock}</td>
<td></td>
<td>in</td>
</tr>
<tr>
<td>\textit{abloom}</td>
<td>\textit{in the mind}</td>
<td></td>
<td>inside</td>
</tr>
<tr>
<td>\textit{alike}</td>
<td>\textit{inside the box}</td>
<td></td>
<td>away</td>
</tr>
<tr>
<td>\textit{alive}</td>
<td>\textit{out of the city}</td>
<td></td>
<td>ahead</td>
</tr>
<tr>
<td>\textit{awake}</td>
<td>\textit{around the ring}</td>
<td></td>
<td>around</td>
</tr>
<tr>
<td>\textit{aware}</td>
<td>\textit{down the stairs}</td>
<td></td>
<td>out</td>
</tr>
</tbody>
</table>

Table 1: Examples of typical adjectives that may appear attributively; \textit{a}-adjectives which resist attributive use; prepositional phrases; and locative particles.

There is certain positive evidence in favor of treating \textit{a}-adjectives as \textit{adjectives}—i.e., with Class 1—and not prepositional phrases (Class 3) or locative particles (Class 4). First, semantically, \textit{a}-adjectives modify a state that is not primarily locative, like the vast majority of other adjectives and unlike prepositional phrases or locative particles. In addition, the verb \textit{seem} provides a classic test for adjective status (Jackendoff 1972, Lakoff 1970), and readily occurs with \textit{a}-adjectives (4a), but not with prepositional phases, or locative particles with spatial interpretations (4b-c):

4.a. The child seemed alive/afraid/afloat/alone/aghast.

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3 Yang includes \textit{across}, \textit{away}, \textit{around}, \textit{ahead}, as \textit{(a)-adjectives}. However, COCA and Google dictionary label them as prepositions (aka locative particles) and/or adverbs. Conflating these instances with the class of \textit{a}-adjectives begs the question of whether locative particles and \textit{a}-adjectives have identical distributions. We include only forms that are tagged as adjectives in COCA and Google dictionary as \textit{a}-adjectives.
b. ??The child seemed on the table/at two o’clock/out of the house.
c. ??The child seemed in/on/out/inside/around/ahead/about.

10. *A*-adjectives are not locative particles

Yang (2015), following Bruening (2011), suggests a piece of positive evidence that indicates that *a*-adjectives behave like locative particles and prepositional phrases. In particular, *a*-adjectives, prepositional phrases, and locative particles, but not regular adjectives are said to appear with a class of *RIGHT-TYPE* adverbs including “*right, well, far, straight* and so on” (Yang, 2015: 15):

5.a. I was well/wide awake at 4am
b. The race leader is well ahead
c. The baby fell right/sound asleep.
d. You can go right ahead.
e. The guards are well aware (of the danger). (examples from Yang 2015:7):

Yang (2015) acknowledges that “probably not all *a*-adjectives may be used with *right-type*” modification…[but].such adverbial modification can not appear at all with typical adjectives” (p. 8). However, in actuality, these adverbs only very rarely occur with only a subset of *a*-adjectives, as is demonstrated by a search of the vast 450 million word COCA corpus (Davies 2008). At the same time, many typical adjectives do occur with *right-type* adverbs. Table 2 includes an exhaustive list of *a*-adjectives that occur even once with the suggested adverbs (left panel). With the single exception of well aware, no *a*-adjectives appear with any regularity with any of the proposed adverbs, and many other *a*-adjectives (e.g., asleep, ablaze, afloat, abloom) do not occur at all. In fact, the same adverbs occur much more often with typical adjectives as indicated by the right panel in Table 2. Thus the “the signature evidence that relates *a*-adjectives to locative particles and prepositional phrases” (Yang: 2015: 15) is not terribly compelling.
Attested uses in the 450 million word COCA corpus

<table>
<thead>
<tr>
<th>EXHAUSTIVE combinations of “right-type” adverbs + a-adjectives (class 2)</th>
<th>#</th>
<th>NON-exhaustive combinations “right-type” adverbs + typical adjectives (class 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight winning</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Straight party-line</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Far greater</td>
<td>1300</td>
<td></td>
</tr>
<tr>
<td>Far worse</td>
<td>720</td>
<td></td>
</tr>
<tr>
<td>Far better</td>
<td>719</td>
<td></td>
</tr>
<tr>
<td>Far different</td>
<td>526</td>
<td></td>
</tr>
<tr>
<td>Far higher</td>
<td>386</td>
<td></td>
</tr>
<tr>
<td>Right good (dialect)</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Right proud (dialect)</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Right fine (dialect)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Right honorable</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Well pleased</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Well worthwhile</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Well familiar</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Well used</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Well early</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Attested instances of right-type adverbs with all a-adjectives (left), and with a subset of typical adjectives that may be used attributively (right). Searches performed on COCA using strings such as, e.g., straight [j*], where [j*] ranges over all adjectives.

No other positive evidence by which to learn the restriction on a-adjectives is suggested.\(^5\)

In fact, even if such evidence were to exist, a link between a-adjectives and locative particles

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\(^4\) Straight does of course occur with ahead, which Yang classifies as an a-adjective, but neither COCA nor Google dictionary classifies ahead as an adjective. It is instead a locative particle or adverb. Not a single a-adjective is returned by an exhaustive COCA search of “straight [j*]” (i.e., straight followed by any adjective).
could not be used to learn the critical restriction on $a$-adjectives. This is because the fundamental assumption that locative particles do not themselves occur in attributive position is flawed. Certain locative particles do occur in attributive position. Note that the attested examples selected in (6) are likely familiar to grade school aged children:6

6. a. the up escalator
   b. the down escalator
   c. the on button
   d. the on ramp
   e. an away game

Thus, right-type adverbs do not provide positive evidence to assimilate $a$-adjectives and only $a$-adjectives to the class of locative particles. And in any case, locative particles themselves do not uniformly show the relevant constraint against attributive usage.

11. $A$-ADJECTIVES ARE NOT PREPOSITIONAL PHRASES

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5 Bruening (2011) suggested that both $a$-adjectives and prepositional phrases occur as complements of have memories of, while other adjectives do not (9b)
   a. I have fond memories of him at work/ on shore/ with his friends.
   b. *I have fond memories of him crazy/ proud of his son/sleepy.
   c. I have fond memories of him asleep/ alone in his office/ ashore. (Bruening 2011)
But (9b) is misleading, because many class 1 adjectives can appear in this position:
   d. I have fond memories of him naked/sun-tanned/sober/drunk.

6 Yang (2015) restricts locative particles to their spatial use, but $a$-adjectives are not generally used in a way that is literally spatial. If we consider locative particles that are used metaphorically or in extended non-locative senses, we find many more attested examples of locative particles used attributively:

   a. an up mood.
   b. a down mood.
   c. the out lesbian.
   d. the in crowd.
   e. the in thing.
   f. on or off the air.
   g. the up side
   h. the up position
   i. the down position
Bruening’s (2011) proposal that \textit{a}-adjectives are actually prepositional phrases underlyingly could in principle offer an explanation of \textit{a}-adjectives’ unusual distribution, since prepositional phrases rarely if ever occur attributively (cf. also Coppock 2008 for a proposal to treat \textit{a}-adjectives as phrasal). In fact, we had suggested that the diachronic status of \textit{a}-adjectives as prepositional phrases motivated their synchronic distribution (Boyd & Goldberg 2011: 62). But for \textit{a}-adjectives to actually be prepositional phrases in synchronic grammar would require that \textit{a}-adjectives patterned with prepositional phrases generally and unlike other adjectives. And, if the only evidence is based on restrictions—that is, on non-occurrences in certain constructions—then the learnability question remains.\footnote{See Goldberg (2011a) for empirical issues with Bruening (2011)’s suggested \textit{restrictions} that were claimed to indicate that \textit{a}-adjectives pattern with prepositional phrases and not with typical adjectives. The general issue with all of the restrictions he had suggested was that each held of many typical adjectives as well as certain \textit{a}-adjectives.} That is, as Yang (2015) and Goldberg (2011) emphasize, unless there exists positive evidence that \textit{a}-adjectives are underlyingly prepositional phrases, learners would still have to learn a \textit{restriction} (or a set of restrictions), and that requires recourse to some type of indirect negative evidence, such as statistical preemption. The positive evidence Bruening had offered was co-occurrence with \textit{right}-type adverbs (see also note 5), but as is clear from Table 2, these adverbs do not distinguish the class of \textit{a}-adjectives from other adjectives. Thus \textit{right}-type adverbs are not helpful as a way to learn that the \textit{a}-adjectives form a special class together with prepositional phrases.

\section{Conclusion}

Positive evidence is useful for learning the range of constructions—pairings of form and function—that are allowed in a given language. Language can also be used creatively by combining existing constructions in new ways. But there exist certain restrictions that do not follow from functional factors (e.g., clashes of semantics or information structure), nor from phonological constraints, nor from the lack of an existing construction to license the general pattern. These types of what Baker (1979: 547) called “embarrassing exceptions” have bedeviled linguists for quite a long time (Ambridge et al. 2008, Bowerman 1988, Braine 1971, Brown & Hanlon 1970, Gennari & MacDonald 2008, Goldberg 1995, Lakoff 1970, Pinker 1989). In the case of the restriction on \textit{a}-adjectives, the available evidence, including experimental findings (Boyd & Goldberg 2011), and the fact that the restriction is learned quite late (Hao 2015), are
consistent with the idea that the restriction is acquired on the basis of error-driven learning in the form of statistical preemption. That is, there are certain contexts when attributive adjective uses are expected. If predicative uses, whether relative clauses or simple predications, are consistently witnessed instead in such contexts, speakers will eventually learn to avoid the attributive use themselves. We assume this is a slow process since it takes time for the relevant evidence to accrue; at the same time, once a restriction on an identifiable subcategory emerges, learners can and do assimilate new members to the restricted category. We have seen that direct positive evidence that $a$-adjectives pattern like locative particles or prepositional phrases and unlike typical adjectives is lacking, even in the very large, 450 million word COCA corpus.
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